BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Foundation Diploma in Applied Science Pearson BTEC International Level 3 Diploma in Applied Science Pearson BTEC International Level 3 Diploma in Biomedical Science Pearson BTEC International Level 3 Diploma in Environmental Science Pearson BTEC International Level 3 Extended Diploma in Applied Science Pearson BTEC International Level 3 Extended Diploma in Biomedical Science Pearson BTEC International Level 3 Extended Diploma in Environmental Science
Unit number and title	**Unit 20: Applications of Physical Chemistry**
Learning aim(s)	**D:** Understand physical chemistry concepts and how industry controls chemical reactions
Assignment title	**Physical chemistry concepts and industry**
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	You are a newly appointed chemical engineering technician working for a chemical company that specializes in making a range of chemical products. In your role you need understand how to control chemical reactions especially when the reactions are scaled up from the laboratory to pilot scale and then to the manufacturing plant. When a reaction is being scaled up you may alter the reaction conditions or the chemical plant equipment to ensure that it is safe to carry out the reaction on a large scale and to achieve the maximum percentage yield of pure product possible in an optimum time frame. You will also need to consider if the product is going to be produced by a continuous process or by a batch process. It is also important for the company to consider other factors such as the health and safety of their plant operators, cost, energy use, reaction time, waste disposal/pollution and the local community. In your first month in your job your supervisor has set up an induction programme for you. You will need to successfully complete this induction to be able to continue as an employee of the company.

Task	As part of your induction into your new role of chemical engineering technician you are required to **analyse** physical chemistry concepts involved in a chemical process; **discuss** actions taken to control a chemical process; **explain** aspects of the operation of an industrial process. Your final portfolio will contain the following 3 sections: <u>Section 1 - Physical chemistry concepts in an industrial process</u> Choose ONE of the following industrial processes on which to complete this section:

- Haber process and associated process to produce hydrogen
- Contact process
- Solvay process
- Oswald process
- methanol and ethanol production
- lime production

- Identify and **Explain** three specific features of the operation of your chosen industrial chemical process using physical chemistry concepts such as for example, why the reaction vessel was in contact with a heat exchanger, why a powdered catalyst was used, why one of the products was continuously removed etc.

- **Discuss** a <u>further</u> three potential measures that may be used to control or affect the operation of your chosen industrial chemical process. These must be additional measures that you have not explained above.

<u>Section 2 – Discuss measures</u>

- **Discuss** the measures that may be taken to control a chemical process that you have been presented with. Identify and discuss three potential measures that may be used to control or affect the operation. Use measures that you have not used in your pass grade answer.

<u>Section 3 – Analysis of chemical processes</u>

Choose ONE of the following industrial processes which you have NOT referred to in Section 1 on which to complete section 2:

- Haber process and associated process to produce hydrogen
- Contact process
- Solvay process
- Oswald process
- methanol and ethanol production

	o lime production • **Analyse** the operation of a chemical process that you have investigated reviewing the ways in which a range of the most applicable physical chemical concepts from the unit specification can be used to optimise the process. Remember this must be a different chemical process to the one you explained and discussed in section 1.
Checklist of evidence required	A portfolio that includes: • An analysis of the operation of an industrial chemical process using physical chemistry concepts. • An explanation of aspects of the operation of a second industrial chemical process using at least three physical chemistry concepts, and a discussion of an additional three actions that may be taken to control the same chemical process.

Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria, you must show that you are able to:
D.D4	Analyse the operation of a chemical process in terms of the physical chemistry concepts involved.
D.M7	Discuss actions that may be taken to control a chemical process.
D.P9	Explain identified aspects of the operation of an industrial process in terms of physical chemical concepts.
Sources of information to support you with this Assignment	All sources of information suggested are UK based. Centres are free to amend these sources to those available in the Country of delivery where more appropriate. www.edu.rsc.org.uk – Who really discovered the Haber process, Thermodynamics and equilibrium of the Solvay process www.rsc.org – Safety issues in the scale up of chemical reactions www.BBC.co.uk – Ostwald Process –revision. Within the copyright laws learners could search YouTube for: – Thermodynamics – variety of clips – Ostwald Process – manufacture of nitric acid; The Contact process – manufacture of Sulphuric acid; Solvay Process; Haber process
Notes to the Assessor and	Practical work may be undertaken when teaching learners the unit content in preparation for this assignment, but is not required to complete the assignment itself.

technician	Before doing any practical activity, you should always carry out your own risk assessment and refer to the necessary regulations. In particular, any local rules issued by your employer must be obeyed, regardless of what is suggested here. Centre should use Health and Safety information provided by a reputable source. In the UK such an example organization is CLEAPSS http://science.cleapss.org.uk/